Navajo Nation – Moenkopi Wash Watershed – Surface Water Quality Assessment Report (Integrated 305(b) Report and 303(d) Listing)

Moenkopi Wash on August 30, 2005

Prepared by:

Navajo Nation Environmental Protection Agency
Water Quality Program
Post Office Box 339
Window Rock, Arizona 86515
(928) 871-7690

January 31, 2020

TABLE OF CONTENTS

FIGURES

TABLES

TABLES (continued)

MAPS

PHOTOGRAPHS

PHOTOGRAPHS (continued)

1.0 Background and Purpose

The objective of the United States Clean Water Act (USCWA) is to "*restore* and *maintain* the chemical, physical, and biological integrity of the Nation's Waters" (USGPO, 1988). In order to meet this objective, and exert its sovereign authority to protect its water resources, the Navajo Nation codified the Navajo Nation Clean Water Act (NNCWA 1999) in July 1999. The importance of water to the Navajo Nation is clearly demonstrated by the adoption of the NNCWA, with the Navajo Nation being only one of a few tribes or states to adopt a clean water act. The NNCWA provides the legislative authority to allow the Navajo Nation to fulfill the USCWA requirements.

In order to *restore* and *maintain* the chemical, physical, and biological integrity of the Nation's Water, states and federally recognized tribes adopt water quality standards which protect the uses of the Nation's water bodies. Water quality standards are narrative and numeric criteria used as benchmarks to determine if a designated use for a water body is being attained. NNCWA Section 103(a) (2) (A) provides for "the establishment of water quality standards to protect fish and wildlife and the domestic, cultural, agricultural and recreational uses of the waters of the Navajo Nation." This is consistent with the "fishable and swimmable goal" set forth in USCWA Sections 101(a) (2) and 303(c) (2). NNCWA Sections 201(b) and (c) requires that designated uses be established for public water supplies, the protection and propagation of fish and wildlife, recreational purposes, agricultural (including livestock watering), industrial, cultural, and other uses, and to establish criteria to protect the designated uses.

The Navajo Nation first codified the 1999 Navajo Nation Water Quality Standards (1999 NNWQS) in July 1999 (NNEPA 1999). On January 20, 2006 the US Environmental Protection Agency (USEPA) approved the Navajo Nation's application to administer the Water Quality Standards and Certification Programs under the federal Clean Water Act's Sections 303 and 401. On March 26, 2009, the USEPA approved the 2007 Navajo Nation Surface Water Quality Standards (2007 NNSWQS) (NNEPA 2008).
The Navajo Nation Surface Water Quality Standards 2015 (NNSWQS 2015) is the revision to the 2007 NNSWQS. The 2015 NNSWQS were approved by the Navajo Nation Council Resources and Development Committee on May 23, 2017.

The Navajo Nation Environmental Protection Agency's National Pollutant Discharge Elimination System / Water Quality Program (NNEPA WQP) is responsible for implementing the requirements of the USCWA and the NNCWA within the Navajo Nation.

This report fulfills the federal Clean Water Act (CWA) Section 305(b) reporting requirements, CWA 303(d) listing requirements, EPA's CWA § 106 Tribal Guidance, Chapter 8 and Appendix A, assessment reporting requirements, and FY 2018-2019 National Water Program Guidance Measures WQ-06a. It also fulfills assessment reporting requirements in the "Navajo Nation Environmental Protection Agency Water Quality/Navajo Nation Pollutant Discharge Elimination System Program, Federal Clean Water Act Performance Partnership Grant" Work Plan.

The purpose of this report is to assess the Moenkopi Wash Watershed surface water quality data obtained by the NNEPA WQP by:

1. Presenting the surface water quality data;
2. Comparing the surface water quality data to the latest version of the NNSWQS to see if standards are being met; and
3. Determine if uses designated for surface waters are being supported using the methods described in the February 20, 2008 NNEPA document entitled: "Guidance for Assessing the Quality of Navajo Nation Surface Waters to Determine Impairment" (Integrated 305(b) Reporting and 303(d) Listing) (NNEPA Impairment Guidance).

The Navajo Nation Moenkopi Wash Watershed Surface Water Quality Assessment Report is intended to be a living document, which can be updated to include the latest surface water quality data. The NNEPA WQP welcomes all comments that will assist in revising this report in the future.

2.0 Moenkopi Wash Watershed

The Moenkopi Wash Watershed (Figure 2.0) is located on approximately 1985 square miles within the Navajo Nation. The United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC) for the Moenkopi Wash Watershed is 15020018 (USGS 1987). The NNEPA WQP watershed code for the Moenkopi Wash Watershed is 26. Detailed geographic locations of the watershed sampling sites may be found in Section 4.0. An atlas of water bodies with known lengths and areas assessed by the NNEPA WQP within this watershed are listed in Table 2.0. There are 173.56 miles and 95.11 acres of sampled surface waters in this watershed.

Figure 2.0 – Moenkopi Wash Watershed (1985 square miles)

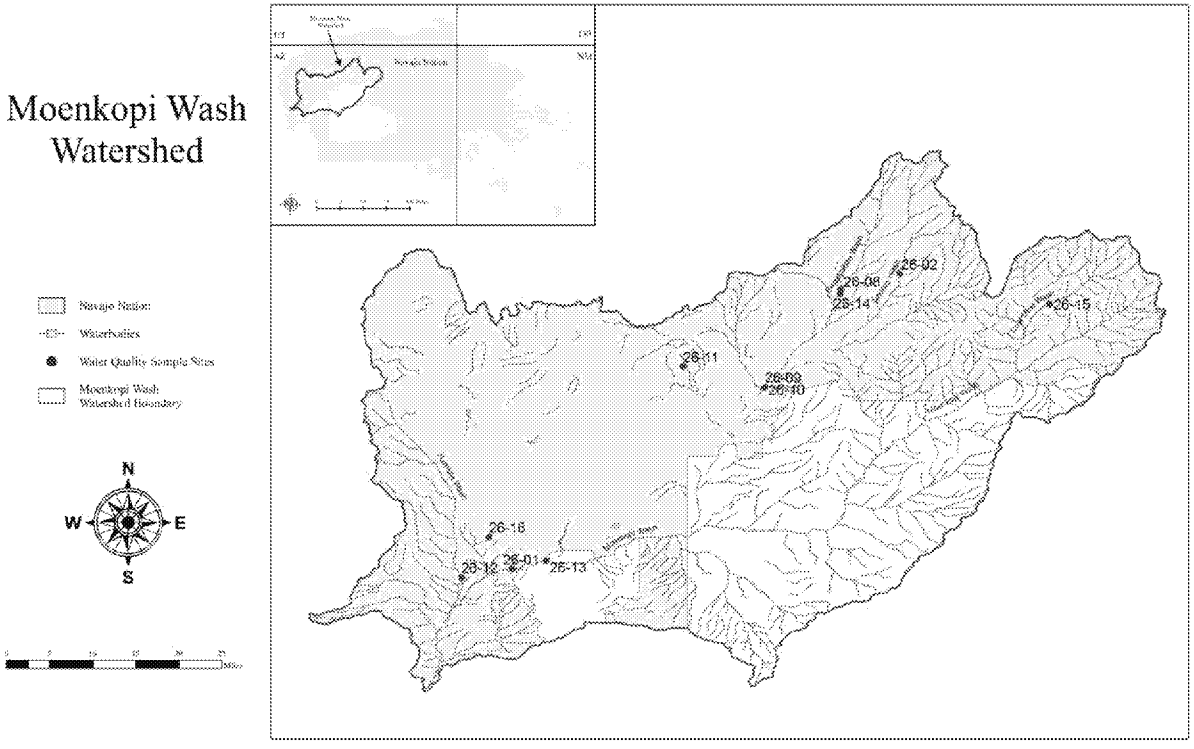


Table 2.0 – – Atlas of Assessed Surface Water Bodies with Known Lengths/Areas

(from Navajo Nation Department of Water Resources - March 31, 2009 and staff calculations)

Surface Water Body Name Within The Navajo Nation	Length (miles) or Area (acres)
Moenkopi Wash	65.53 miles
Hamblin Wash	30.30 miles
Begashibito Wash	33.69 miles
Shonto Wash	24.04 miles
Cow Springs Lake	74.20 acres
White Mesa Lake	20.91 acres
Coal Mine Wash	20.00 miles
Moenave Spring	0 miles

3.0 Moenkopi Wash Watershed - Surface Water Quality Data Collection Activities

Monitoring and water quality sampling of the Moenkopi Wash Watershed was conducted using professional experience and in accordance with the NNEPA WQP June 1, 2012 "Quality Assurance Plan for Surface Water Data Collection" or previous quality assurance plans. Measurements of physical/ chemical characteristics and stream discharge were made. Samples were obtained and submitted to an analytical laboratory for analyses. Quality Assurance and Quality Control samples were also obtained.

4.0 Moenkopi Wash Watershed - Surface Water Quality Data Assessment

The following tables provide detailed information on the Moenkopi Wash Watershed sample sites. When available a site photograph is provided. The sample site name used for sampling is provided along with the alias used to locate the sample site on the watershed map in Section 2.0. The total number of years sampled is provided along with years sampled during the assessment period. The assessment period is the consecutive time period where a minimum number of samples must be obtained in order to determine designated use support. In most instances it is a three year consecutive period where a minimum of five samples must be obtained. (Please refer to the NNEPA Impairment Guidance). Water quality data at each site was compared to the numeric standards in the NNSWQS 2015. Uses designated for each water body in the NNSWQS 2015 are listed in each table. These uses may include Domestic Water Supply (Dom), Primary Human Contact (PrHC), Secondary Human Contact (ScHC), Fish Consumption (FC), Aquatic & Wildlife (Acute and Chronic) (A&W (A) and A&W (C)), Agricultural Water Supply (AgWS), and Livestock Watering (LW). Exceedances of the numeric standard are provided for any analyte for both the individual analyte and for the analytes corresponding to each designated use. Also provided are the percentages of exceedances from the number of samples obtained. The letter "n" refers to the number of samples obtained.

Analytes are listed in each table only if they have been found to have exceeded the numeric standard at any surface water sample site within the watershed. If, for example, aluminum is listed as an analyte at "Site X" but did not exceed the numeric standard at "Site X", it is listed because it did exceed the numeric standard at another location within the watershed, "Site A". The purpose of this is to understand the distribution of the analyte within the watershed.

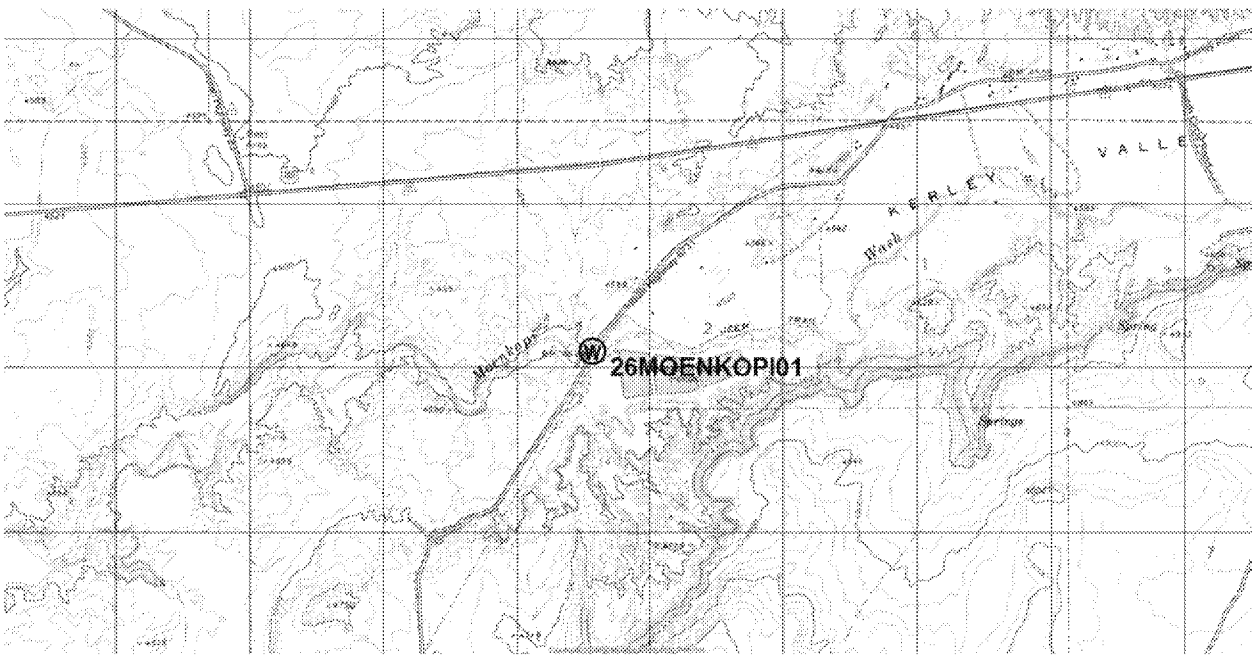
The category of designated use support from the NNEPA Impairment Guidance may be found at the end of each table. Designated use support categories are determined, in part, by comparing the analytical

result at each sample site to the NNSWQS 2015. The NNEPA WQP may also choose to list surface waters as impaired if it pursues primacy granted by USEPA for federal Clean Water Act Section 303(d).

A previous study of Moenkopi Wash canal water used for irrigation in Curley Valley was completed on January 4, 2010. The study is entitled "Moenkopi Wash Canal – Navajo Nation Surface Water Quality Report". A reanalysis of the data presented in that report compared to the 2015 NNSWQS revealed the minimum number of samples to determine designated use support obtained during the assessment period was not obtained therefore there is insufficient data to determine if any designated use is supported. This corresponds to a category 3 of designated use support.

To obtain a copy of this report and to obtain the complete set of surface water quality analytical data from this watershed used in these tables please call 505-368-1037.

Map 4.1 – Moenkopi Wash Sample Site 26MOENKOPI01

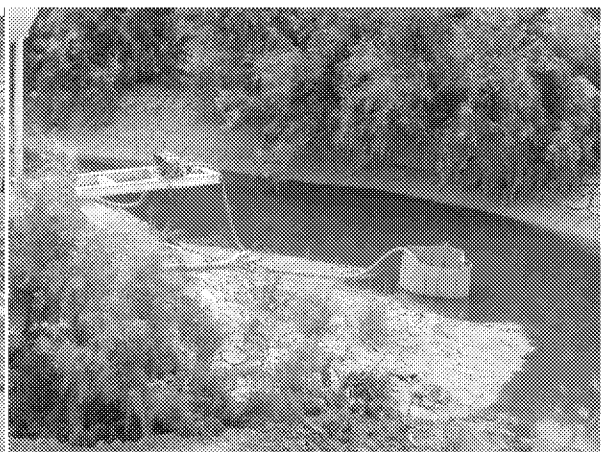


Photographs 4.1 – Moenkopi Wash Sample Site 26MOENKOPI01

July 11, 2001

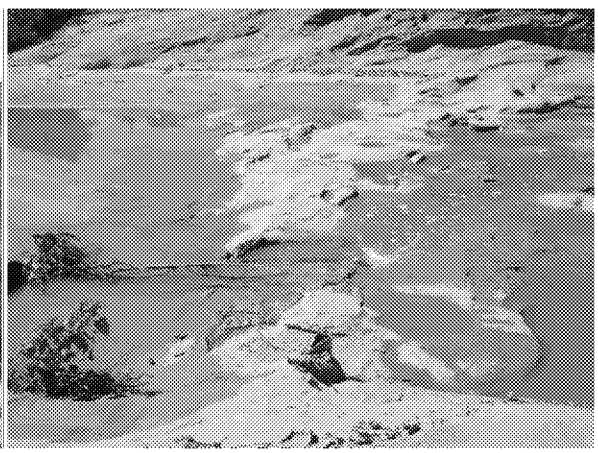
July 11, 2001

August 5, 2002 – dam



August 5, 2002 - pump

August 5, 2003 - pump



August 5, 2003

Photographs 4.1 – Moenkopi Wash Sample Site 26MOENKOPI01 (continued)

April 14, 2004

April 14, 2004

April 14, 2004 – vehicle and trash dumping in tributary adjacent to sample site

August 30, 2005

August 30, 2005

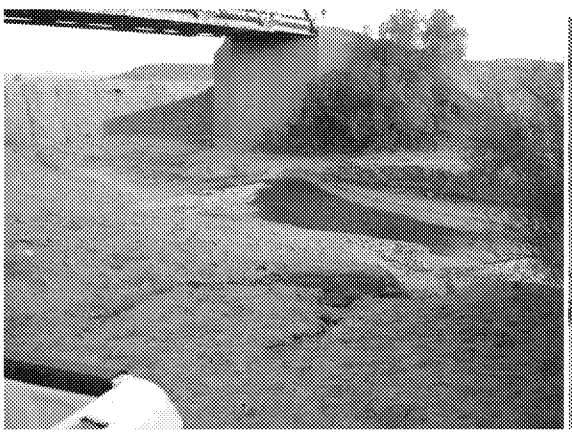
Photographs 4.1 – Moenkopi Wash Sample Site 26MOENKOPI01 (continued)

June 7, 2006

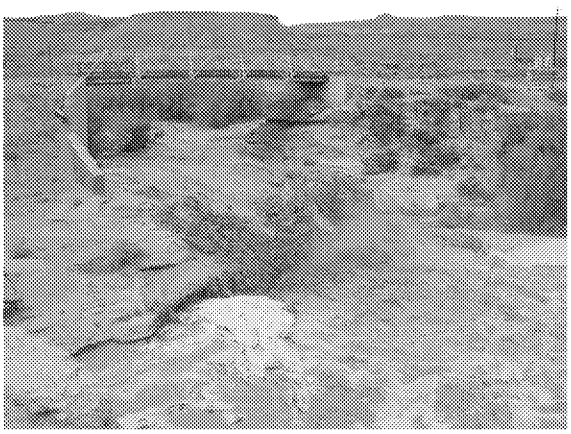
June 7, 2006

July 24, 2008

July 24, 2008

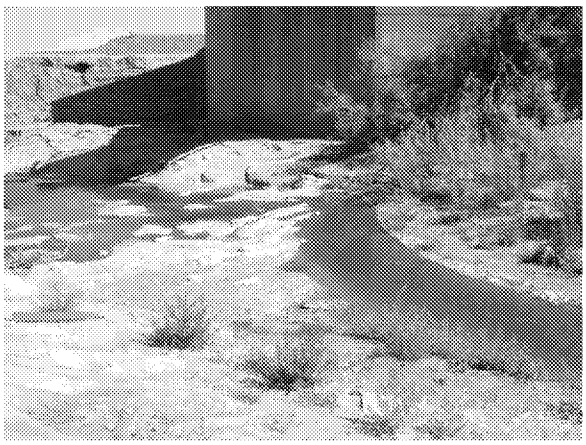


September 8, 2008



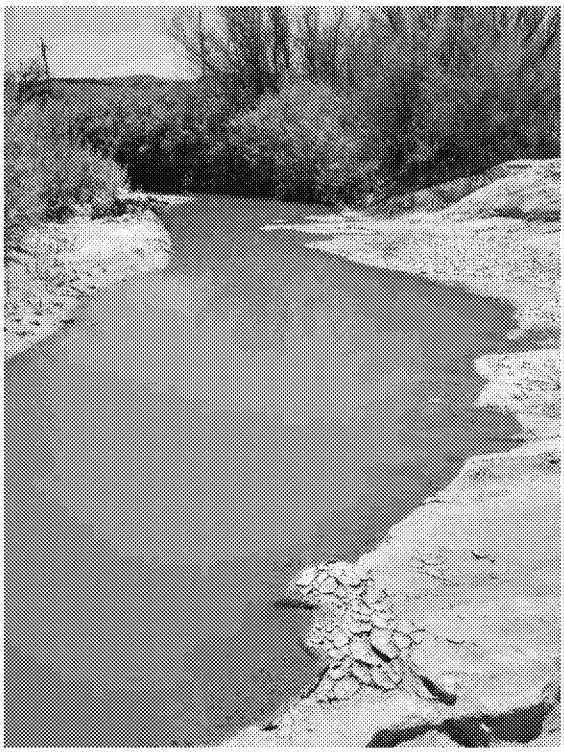
July 30, 2012

Photographs 4.1 – Moenkopi Wash Sample Site 26MOENKOPI01 (continued)

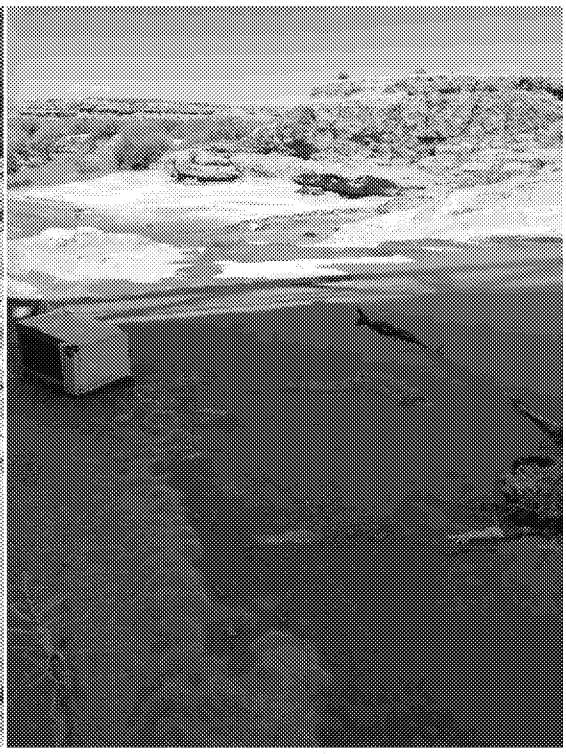


June 27, 2017

June 27, 2017



August 13, 2019



August 13, 2019 – trash in wash

Table 4.1 – Moenkopi Wash – Water Quality Data Assessment Table

Site 26MOENKOPI01

Site	Alias	Location
26MOENKOPI01	26-01	Moenkopi Wash @ Tuba City WWTF

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2001-2019	18	2017-2019	5

*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
FC	7	4	3	3
PrHC	5	3	3	3
ScHC	4	2	2	2
A&WHbt (A)	2	2	1	1
A&WHbt (C)	4	2	1	1
AgWS	10	7	5	5
LW	10	5	4	4

	Fish Consumption					
	All samples			Assessment period		
Analyte	Exceedances	n	Percent	Exceedances	n	Percent
Beryllium (T)	2	16	12.5%	1	5	20.0%
Mercury (T)	2	18	11.1%	0	5	0.0%
Thallium (T)	1	15	6.7%	1	5	20.0%
Zinc (T)	2	16	12.5%	1	5	20.0%

	Primary Human Contact					
	All samples			Assessment period		
Analyte	Exceedances	n	Percent	Exceedances	n	Percent
Arsenic (T)	1	15	6.7%	1	5	20.0%
Lead (T)	3	16	18.8%	1	5	20.0%
Manganese (T)	1	5	20.0%	1	5	20.0%

Table 4.1 – Moenkopi Wash – Water Quality Data Assessment Table (continued)

Analyte	Secondary Human Contact					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Lead (T)	3	16	18.8%	1	5	20.0%
Manganese (T)	1	5	20.0%	1	5	20.0%

Analyte	Aquatic and Wildlife Habitat (Acute)					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	16	0.0%	0	5	0.0%
Chlorine (T)	1	1	100.0%	0	0	--
Copper (D)	0	16	0.0%	0	5	0.0%
Lead (D)	0	16	0.0%	0	5	0.0%
Selenium (T)	1	17	5.9%	1	5	20.0%
Zinc (D)	0	16	0.0%	0	5	0.0%

Analyte	Aquatic and Wildlife Habitat (Chronic)					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	16	0.0%	0	5	0.0%
Chlorine (T)	1	1	100.0%	0	0	--
Copper (D)	0	16	0.0%	0	5	0.0%
Lead (D)	0	16	0.0%	0	5	0.0%
Nickel (D)	0	16	0.0%	0	5	0.0%
Selenium (T)	3	17	17.6%	1	5	20.0%
Zinc (D)	0	16	0.0%	0	5	0.0%

Analyte	Agricultural Water Supply					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Aluminum (T)	3	15	20.0%	1	5	20.0%
Chromium (T)	1	15	6.7%	1	5	20.0%
Manganese (T)	1	5	20.0%	1	5	20.0%
Nickel (T)	1	16	6.3%	0	5	0.0%
Selenium (T)	1	17	5.9%	1	5	20.0%
Vanadium (T)	2	7	28.6%	1	5	20.0%
Zinc (T)	1	16	6.3%	0	5	0.0%

Table 4.1 – Moenkopi Wash – Water Quality Data Assessment Table (continued)

Analyte	Livestock Watering					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Chlorine (T)	1	1	100.0%	0	0	--
Chromium (T)	1	15	6.7%	1	5	20.0%
Copper (T)	3	15	20.0%	1	5	20.0%
Lead (T)	3	16	18.8%	1	5	20.0%
Vanadium (T)	2	7	28.6%	1	5	20.0%

4.1 Moenkopi Wash - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? Yes.**
- **Category of Designated Use Support: Category 5b – At least one designated use is not supported and a review of the designated use and/or water quality standards will be conducted to determine if appropriate for the surface water body.**
- **Category 5b is specific to the one exceedance of the Aquatic and Wildlife Habitat acute selenium standard.**
- **The following compounds were detected in water samples obtained from Moenkopi Wash on August 13, 2019:**

Atenolol - a beta blocker medication primarily used to treat high blood pressure and heart-associated chest pain,

Azithromycin - used to treat a wide variety of bacterial infections. It is a macrolide-type antibiotic,

Caffeine - a central nervous system stimulant of the methylxanthine class,

Carbamazepine – Anticonvulsant - can treat seizures, nerve pain, and bipolar disorder,

Cotinine - an alkaloid found in tobacco and is also the predominant metabolite of nicotine. Cotinine is used as a biomarker for exposure to tobacco, smoke. Cotinine is currently being studied as a treatment for depression, PTSD, schizophrenia, Alzheimer's disease and Parkinson's disease,

DEET - a brand of diethyltoluamide, a colorless oily liquid with a mild odor, used as an insect repellent,

Phenytoin (Dilantin) **- *an*** anti-epileptic drug, also called an anticonvulsant. Phenytoin works by slowing down impulses in the brain that cause seizures. Phenytoin is used to control seizures,

Sulfamethoxazole - (SMZ or SMX) is an antibiotic. It is used for bacterial infections such as urinary tract infections, bronchitis, and prostatitis and is effective against both gram negative and positive bacteria such as Listeria monocytogenes and E. coli,

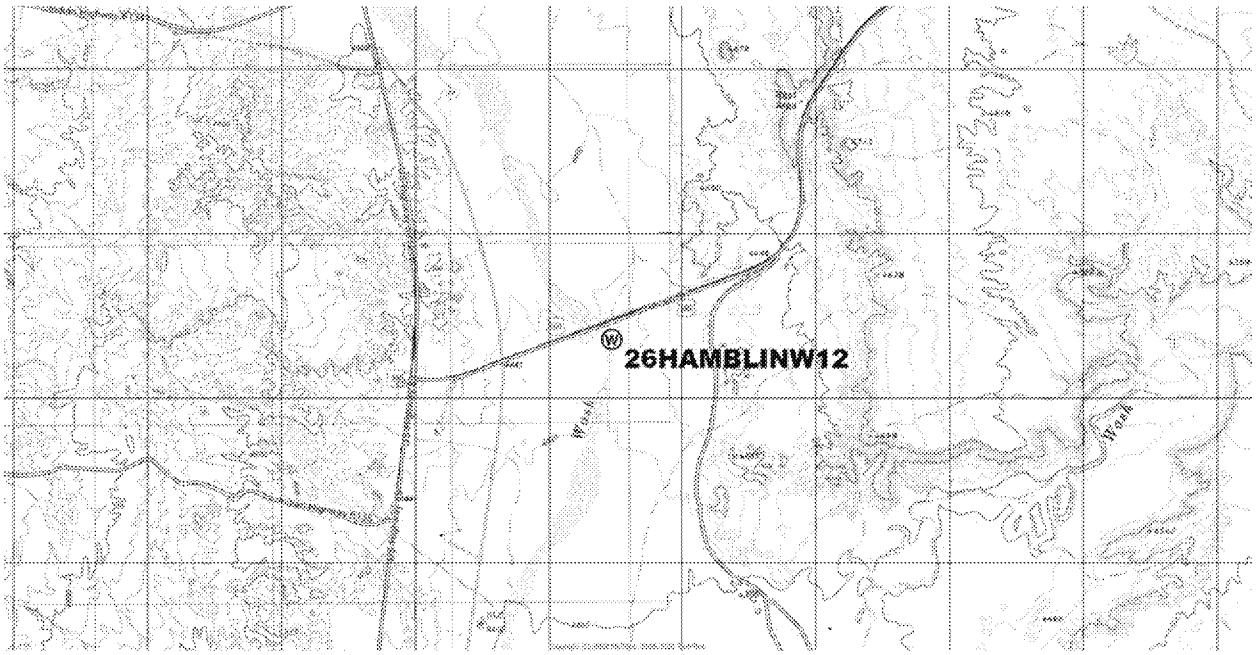
TCEP - A flame retardant added to polyurethane foam and is found in furniture and baby products, as well as some plastics and carpet backing. In a 2002 study examining stream contaminants near industrial facilities, TCEP was one of the most common.TCEP is a foam additive that over time escapes from the foam of furniture and sticks to house dust. The dust subsequently lands on household surfaces, including toys and food, and is eventually ingested. Young children are the most likely to be exposed because of their tendency to put toys and their hands into their mouths,

TCPP - a chemical compound used as a flame retardant, plasticizer, and viscosity regulator in various types of polymers, including polyurethanes, polyester resins, and polyacrylates, and

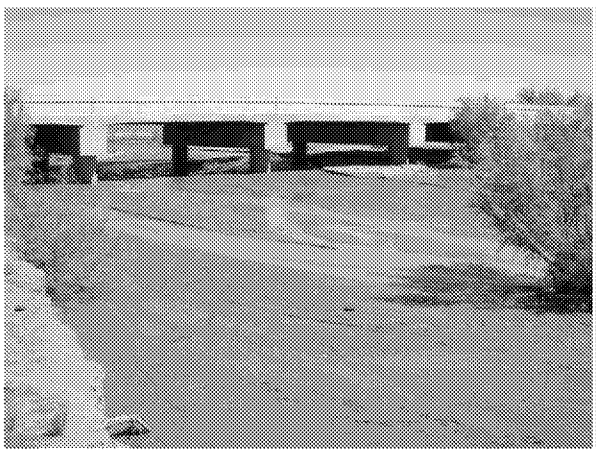
TDCPP - a flame retardant used in children's pajamas in the 1970s until it was eliminated from that use due to adverse health effects. Now, TDCPP is a widely used flame retardant added to polyurethane foam in furniture and baby products

There are currently no water quality standards for the above mentioned compounds.

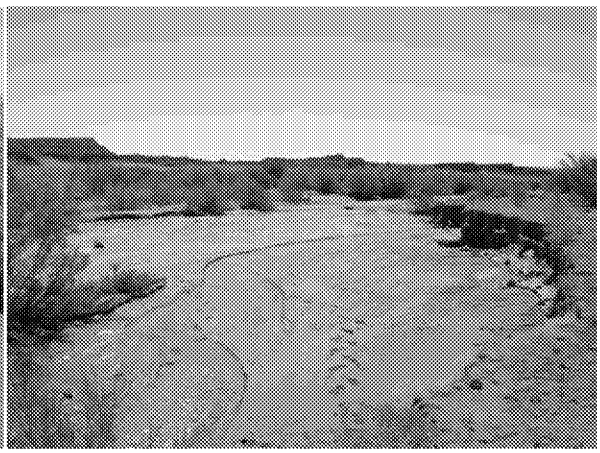
Map 4.2 – Hamblin Wash Sample Site 26HAMBLINW12



Photographs 4.2 – Hamblin Wash Sample Site 26HAMBLINW12



August 19, 2008



August 19, 2008

Table 4.2 – Hamblin Wash – Water Quality Data Assessment Table

Site 26HAMBLINW12

Site	Alias	Location
26HAMBLINW12	26-12	Hamblin Wash @ US 160

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2008	1	2008	1

*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
ScHC	0	0	0	0
A&WHbt (A)	3	3	3	3
A&WHbt (C)	4	4	4	4
AgWS	1	1	1	1
LW	0	0	0	0

	Aquatic and Wildlife Habitat (Acute)					
	All samples			Assessment period		
Analyte	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	1	0.0%	0	1	0.0%
Chlorine (T)	--	0	--	--	0	--
Copper (D)	1	1	100.0%	1	1	100.0%
Lead (D)	1	1	100.0%	1	1	100.0%
Selenium (T)	0	1	0.0%	0	1	0.0%
Zinc (D)	1	1	100.0%	1	1	100.0%

	Aquatic and Wildlife Habitat (Chronic)					
	All samples			Assessment period		
Analyte	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	1	0.0%	0	1	0.0%
Chlorine (T)	--	0	--	--	0	--
Copper (D)	1	1	100.0%	1	1	100.0%
Lead (D)	1	1	100.0%	1	1	100.0%
Nickel (D)	1	1	100.0%	1	1	100.0%
Selenium (T)	0	1	0.0%	0	1	0.0%
Zinc (D)	1	1	100.0%	1	1	100.0%

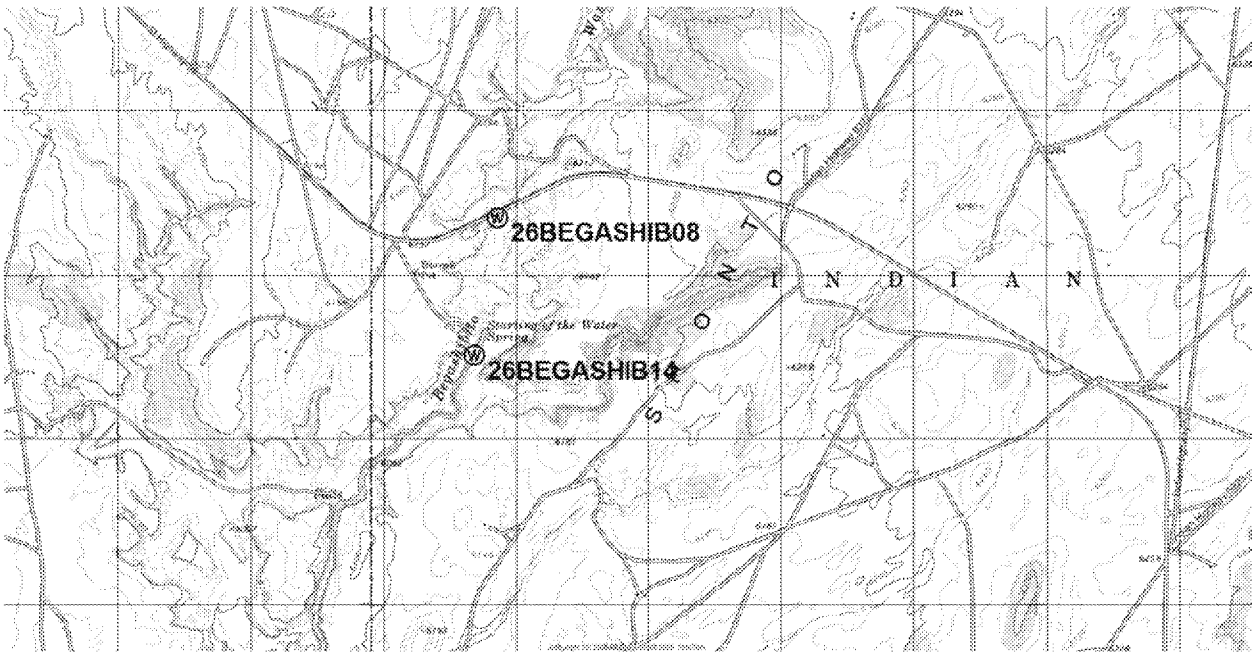
Table 4.2 – Hamblin Wash – Water Quality Data Assessment Table (continued)

Analyte	Agricultural Water Supply					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Aluminum (T)	1	1	100.0%	1	1	100.0%
Chromium (T)	0	1	0.0%	0	1	0.0%
Manganese (T)	--	0	--	--	0	--
Nickel (T)	0	1	0.0%	0	1	0.0%
Selenium (T)	0	1	0.0%	0	1	0.0%
Vanadium (T)	--	0	--	--	0	--
Zinc (T)	0	1	0.0%	0	1	0.0%

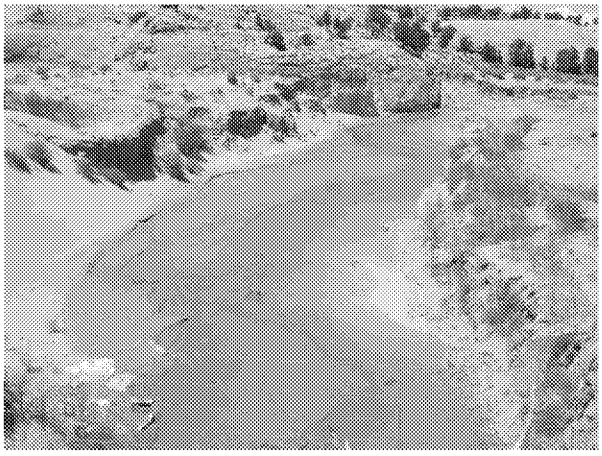
4.2 Hamblin Wash - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? No**
- **Category of Designated Use Support: Category 3 - There is insufficient data to determine if any designated use is supported.**

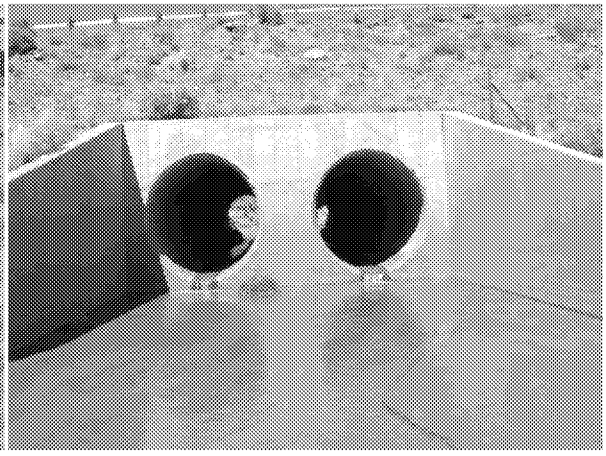
Map 4.3 – Begashibito Wash Sample Sites 26BEGASHIB08 and 26BEGASHIB14



Photographs 4.3 – Begashibito Wash Sample Site 26BEGASHIB08

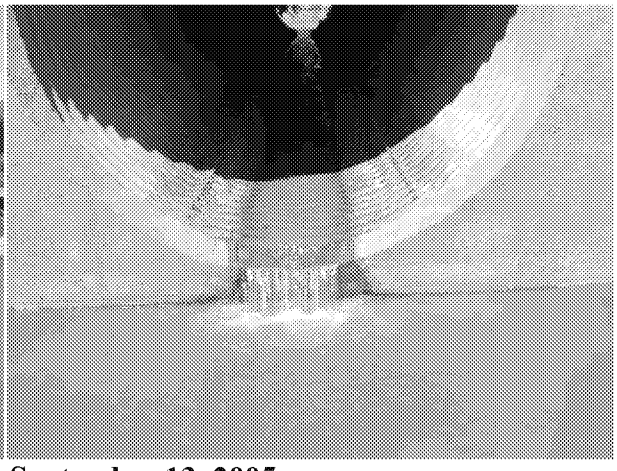


July 20, 2004



September 13, 2005

September 13, 2005



September 13, 2005

Table 4.3 – Begashibito Wash Site 26BEGASHIB08 – Water Quality Data Assessment Table

Site 26BEGASHIB08

Site	Alias	Location
26BEGASHIB08	26-08	Begashibito Wash @ SR 98

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2002-2005	2	2005	1

*Note that not all analytes were necessarily sampled each sample event.

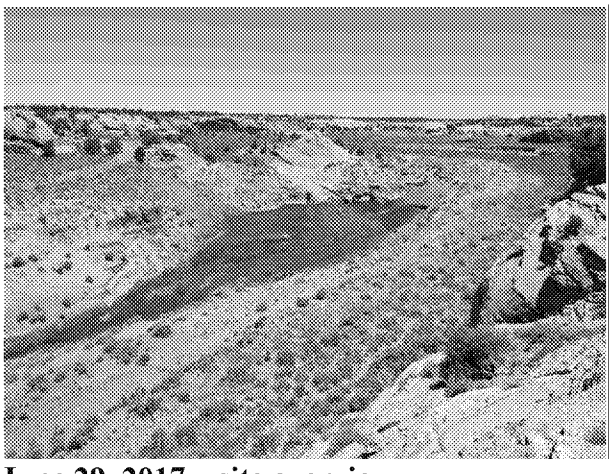
Designated Use	All samples		Assessment period	
	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
ScHC	0	0	0	0
A&WHbt (A)	0	0	0	0
A&WHbt (C)	1	1	1	1
AgWS	0	0	0	0
LW	0	0	0	0

Analyte	Aquatic and Wildlife Habitat (Chronic)					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	2	0.0%	0	1	0.0%
Chlorine (T)	--	0	--	--	0	--
Copper (D)	0	2	0.0%	0	1	0.0%
Lead (D)	0	2	0.0%	0	1	0.0%
Nickel (D)	0	2	0.0%	0	1	0.0%
Selenium (T)	1	2	50.0%	1	1	100.0%
Zinc (D)	0	2	0.0%	0	1	0.0%

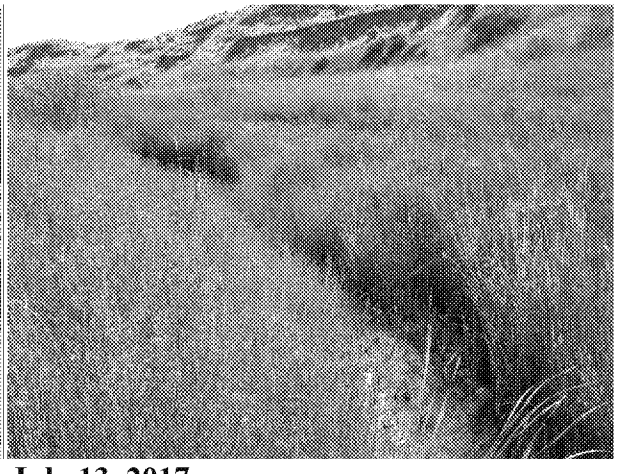
4.3 Begashibito Wash Site 26BEGASHIB08- Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? No**
- **Category of Designated Use Support: Category 3 - There is insufficient data to determine if any designated use is supported.**

Photographs 4.3.1 – Begashibito Wash Sample Site 26BEGASHIB14



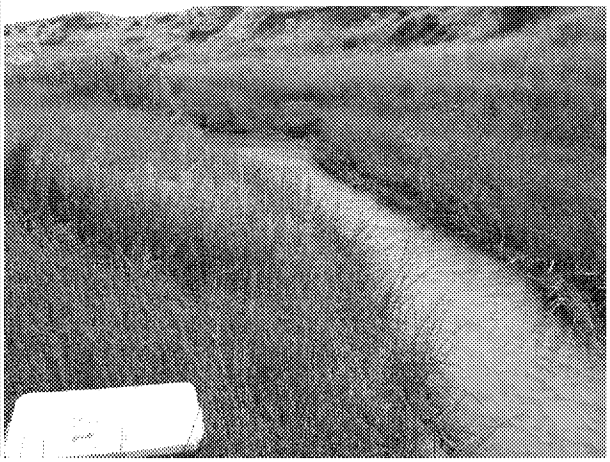
June 29, 2017 – site overview



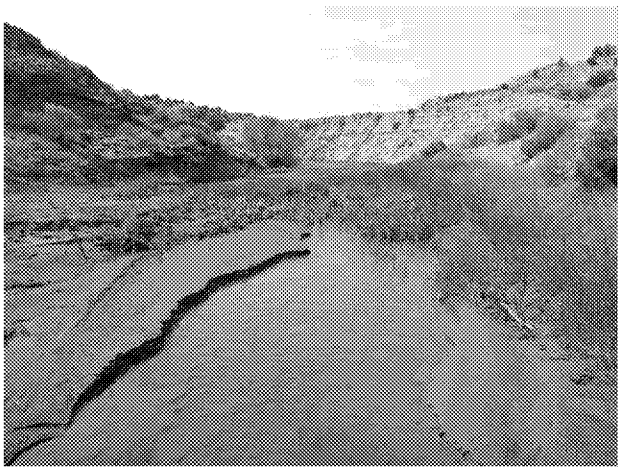
July 13, 2017

Photographs 4.3.1 – Begashibito Wash Sample Site 26BEGASHIB14 (continued)

July 13, 2017



September 27, 2017



September 27, 2017

August 14, 2019

August 14, 2019

August 28, 2019

Table 4.3.1 – Begashibito Wash Site 26BEGASHIB14 – Water Quality Data Assessment Table

Site 26BEGASHIB14

Site	Alias	Location
26BEGASHIB14	26-14	Begashibito Wash ~1/2 mile d/s from SR 98

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2017-2019	5	2017-2019	5

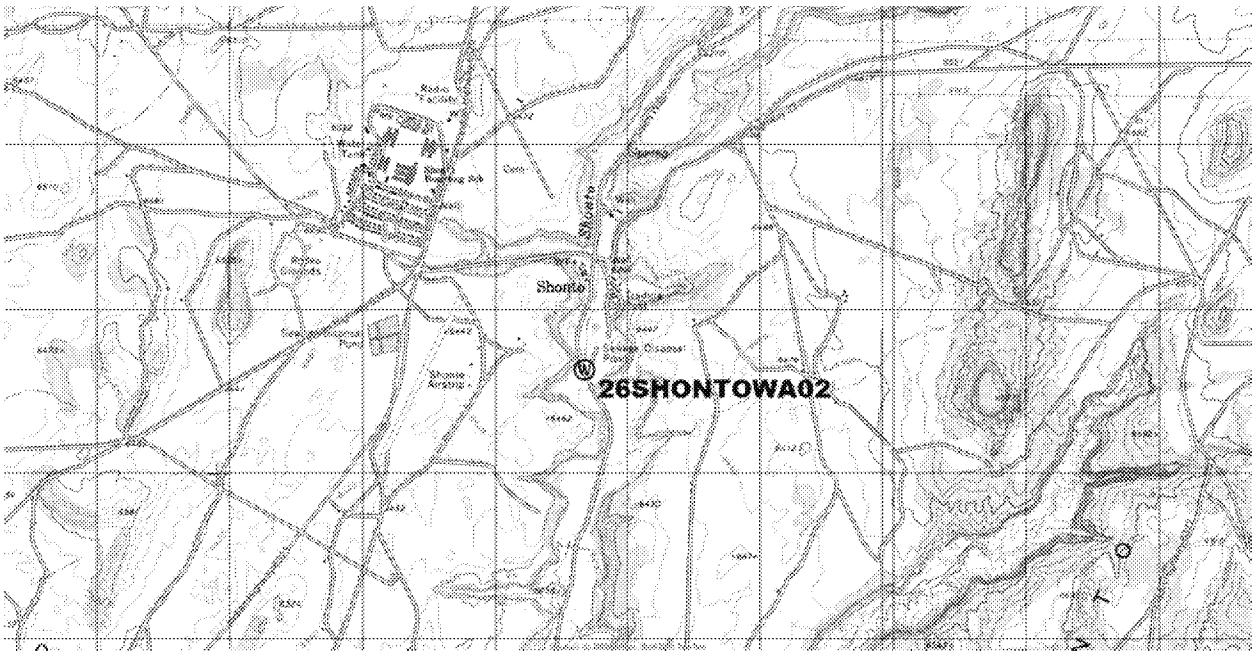
*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
FC	0	0	0	0
PrHC	0	0	0	0
ScHC	0	0	0	0
A&WHbt (A)	0	0	0	0
A&WHbt (C)	0	0	0	0
AgWS	0	0	0	0
LW	0	0	0	0

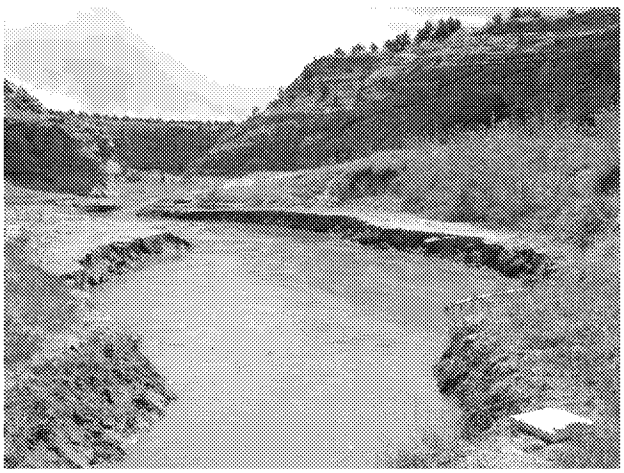
4.3.1 Begashibito Wash Site 26BEGASHIB14- Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? Yes.**
- **Category of Designated Use Support: Category 1 – All designated uses are supported**

Map 4.4 – Shonto Wash Sample Site 26SHONTOWA02



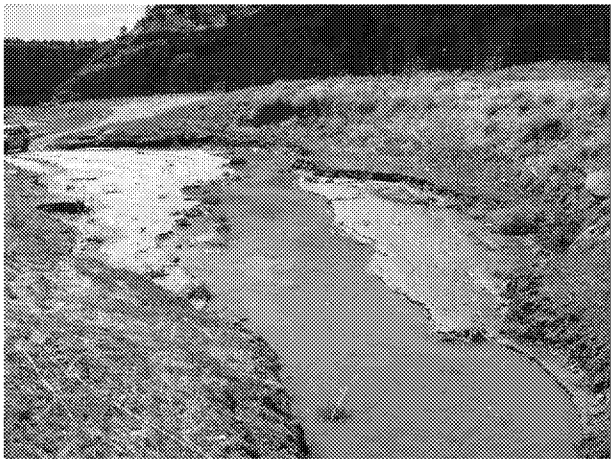
Photographs 4.4 – Shonto Wash Sample Site 26SHONTOWA02



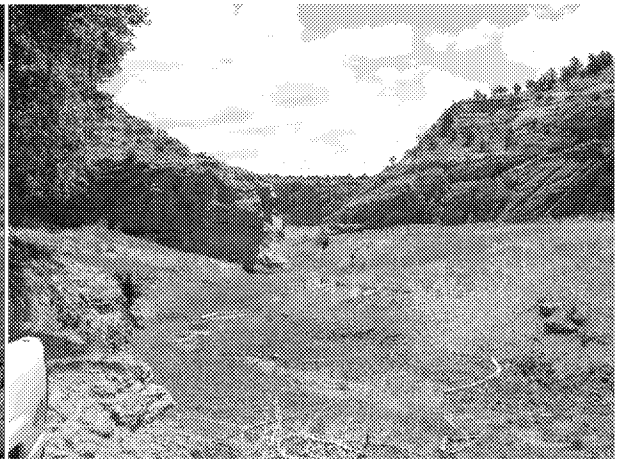
August 31, 2004

August 31, 2004

Photographs 4.4 – Shonto Wash Sample Site 26SHONTOWA02 (continued)



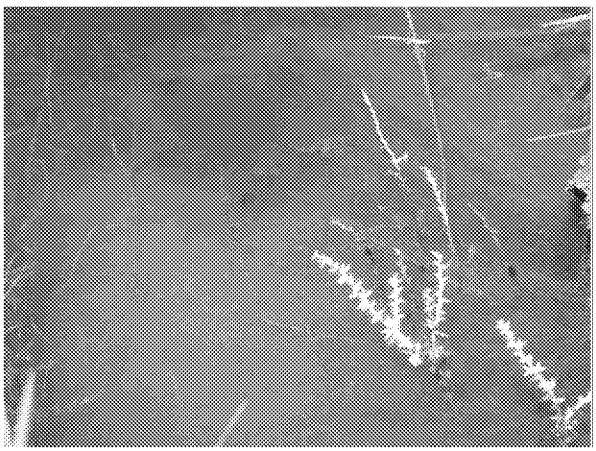
April 7, 2005

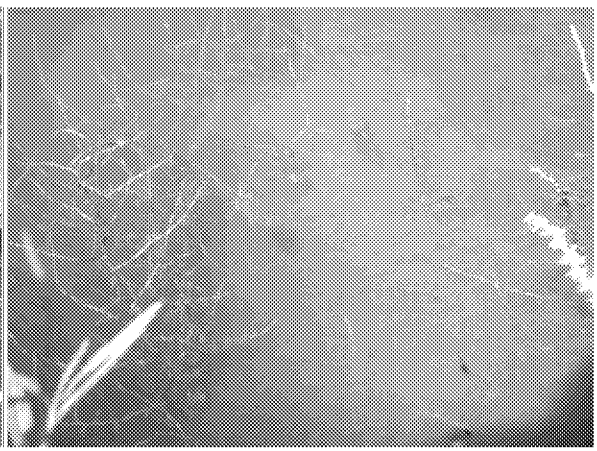


June 18, 2009

June 18, 2009

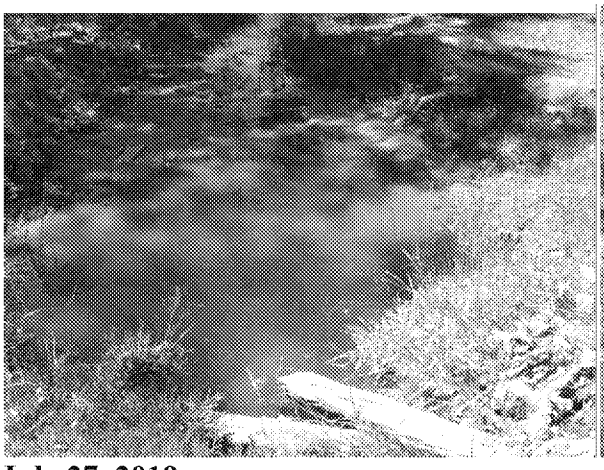
July 11, 2017



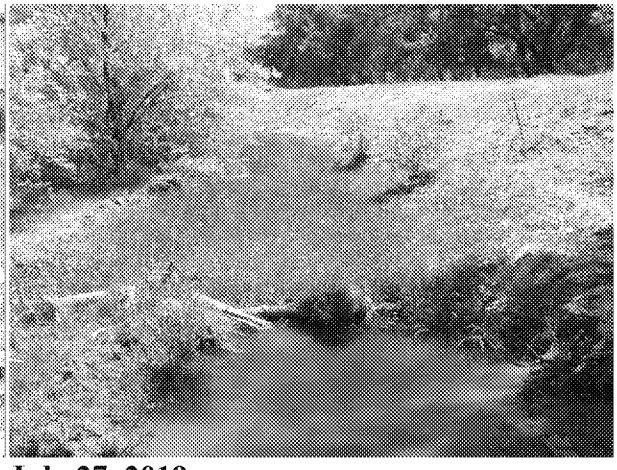


June 27, 2019 – tadpoles and tadpoles evolving into frogs

Photographs 4.4 – Shonto Wash Sample Site 26SHONTOWA02 (continued)



July 27, 2019



July 27, 2019

Table 4.4 – Shonto Wash – Water Quality Data Assessment Table

Site 26SHONTOWA02

Site	Alias	Location
26SHONTOWA02	26-02	Shonto Wash @ Shonto

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2002-2019	14	2017-2019	7

*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
FC	0	0	0	0
PrHC	2	1	2	1
ScHC	2	1	2	1
A&WHbt (A)	2	1	0	0
A&WHbt (C)	4	2	2	1
AgWS	3	1	2	1
LW	2	1	0	0

Table 4.4 – Shonto Wash – Water Quality Data Assessment Table (continued)

Analyte	Primary Human Contact					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Arsenic (T)	0	13	0.0%	0	7	0.0%
Lead (T)	2	13	15.4%	2	7	28.6%
Manganese (T)	0	7	0.0%	0	7	0.0%

Analyte	Secondary Human Contact					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Lead (T)	2	13	15.4%	2	7	28.6%
Manganese (T)	0	7	0.0%	0	7	0.0%

Analyte	Aquatic and Wildlife Habitat (Acute)					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	14	0.0%	0	7	0.0%
Chlorine (T)	2	2	100.0%	0	0	--
Copper (D)	0	14	0.0%	0	7	0.0%
Lead (D)	0	14	0.0%	0	7	0.0%
Selenium (T)	0	14	0.0%	0	7	0.0%
Zinc (D)	0	14	0.0%	0	7	0.0%

Analyte	Aquatic and Wildlife Habitat (Chronic)					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	0	14	0.0%	0	7	0.0%
Chlorine (T)	2	2	100.0%	0	0	--
Copper (D)	0	14	0.0%	0	7	0.0%
Lead (D)	0	14	0.0%	0	7	0.0%
Nickel (D)	0	14	0.0%	0	7	0.0%
Selenium (T)	2	14	14.3%	2	7	28.6%
Zinc (D)	0	14	0.0%	0	7	0.0%

Table 4.4 – Shonto Wash – Water Quality Data Assessment Table (continued)

Analyte	Agricultural Water Supply					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Aluminum (T)	3	12	25.0%	2	7	28.6%
Chromium (T)	0	13	0.0%	0	7	0.0%
Manganese (T)	0	7	0.0%	0	7	0.0%
Nickel (T)	0	13	0.0%	0	7	0.0%
Selenium (T)	0	14	0.0%	0	7	0.0%
Vanadium (T)	0	7	0.0%	0	7	0.0%
Zinc (T)	0	13	0.0%	0	7	0.0%

Analyte	Livestock Watering					
	All samples			Assessment period		
	Exceedances	n	Percent	Exceedances	n	Percent
Chlorine (T)	2	2	100.0%	0	0	--
Chromium (T)	0	13	0.0%	0	7	0.0%
Copper (T)	0	13	0.0%	0	7	0.0%
Lead (T)	0	13	0.0%	0	7	0.0%
Vanadium (T)	0	7	0.0%	0	7	0.0%

4.4 Shonto Wash - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? Yes.**
- **Category of Designated Use Support: Category 5b – At least one designated use is not supported and a review of the designated use and/or water quality standards will be conducted to determine if appropriate for the surface water body.**
- **Category 5b is specific to only to:**

  Two exceedances of both the Primary and Secondary Human Contact lead standard,

  Two exceedances of the Aquatic and Wildlife Habitat chronic selenium standard, and

Two exceedances of the Agricultural Water Supply aluminum standard (A proposed revision to all numeric Agricultural Water Supply standards, including aluminum, is being undertaken).

- **The following compounds were detected in water samples obtained from Shonto Wash on June 27, 2019:**

Caffeine - a central nervous system stimulant of the methylxanthine class

Ciprofloxacin - a fluoroquinolone (flor-o-KWIN-o-lone) antibiotic that fights bacteria in the body. It is used to treat different types of bacterial infections, including skin infections, bone and joint infections, respiratory or sinus infections, urinary tract infections, and certain types of diarrhea

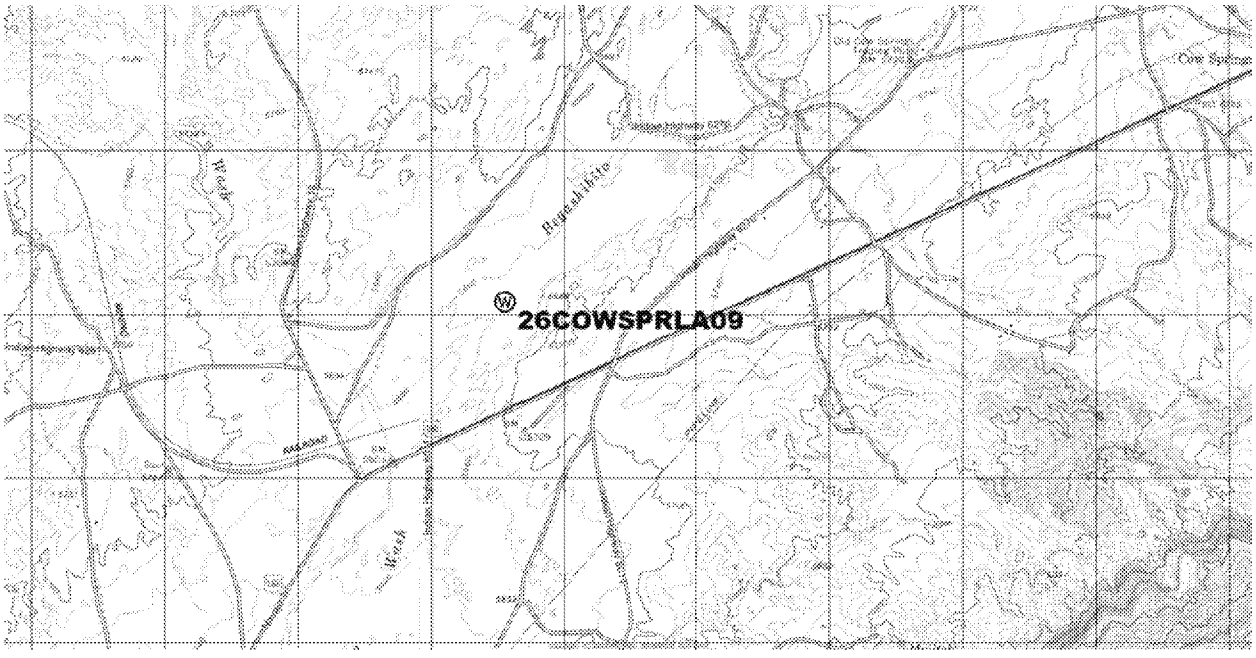
DEET - a brand of diethyltoluamide, a colorless oily liquid with a mild odor, used as an insect repellent

TCEP - A flame retardant added to polyurethane foam and is found in furniture and baby products, as well as some plastics and carpet backing. In a 2002 study examining stream contaminants near industrial facilities, TCEP was one of the most common.TCEP is a foam additive that over time escapes from the foam of furniture and sticks to house dust. The dust subsequently lands on household surfaces, including toys and food, and is eventually ingested. Young children are the most likely to be exposed because of their tendency to put toys and their hands into their mouths.

TCPP - a chemical compound used as a flame retardant, plasticizer, and viscosity regulator in various types of polymers including polyurethanes, polyester resins, and polyacrylates.

There are currently no water quality standards for the above mentioned compounds.

Map 4.5 – Cow Springs Lake - Sample Site 26COWSPRLA09



Photographs 4.5 – Cow Springs Lake Sample Site 26COWSPRLA09

July 13, 2004 – water truck pumping

July 13, 2004 – migratory water fowl

Photographs 4.5 – Cow Springs Lake Sample Site 26COWSPRLA09 (continued)

August 8, 2006

August 8, 2006

August 27, 2008

August 27, 2008

Table 4.5 – Cow Springs Lake – Water Quality Data Assessment Table

Site 26COWSPRLA09

Site	Alias	Location
26COWSPRLA09	26-09	Cow Springs Lake

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2003-2009	6	2004-2006	3

*Note that not all analytes were necessarily sampled each sample event.

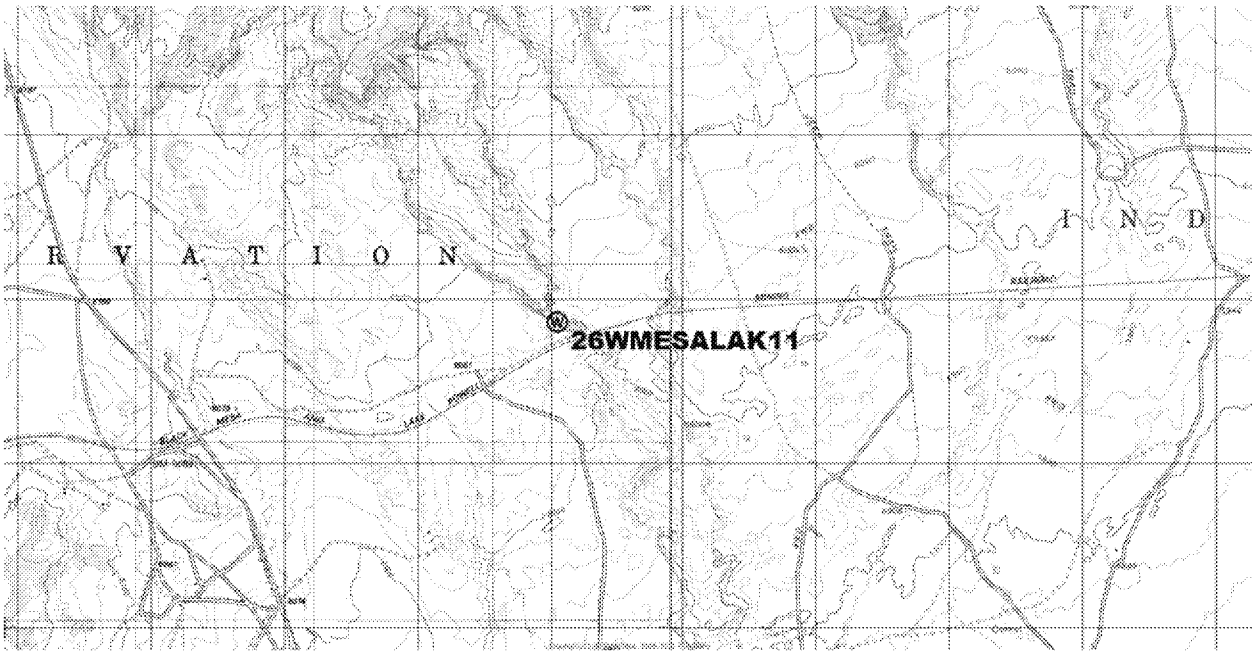
Table 4.5 – Cow Springs Lake – Water Quality Data Assessment Table (continued)

Designated Use	All samples		Assessment period	
	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
FC	0	0	0	0
PrHC	0	0	0	0
ScHC	0	0	0	0
A&WHbt (A)	0	0	0	0
A&WHbt (C)	0	0	0	0
AgWS	0	0	0	0
LW	0	0	0	0

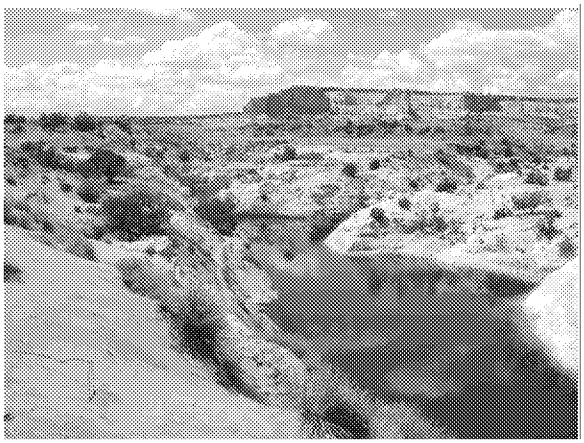
4.5 Cow Springs Lake - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? No**
- **Category of Designated Use Support: Category 3 - There is insufficient data to determine if any designated use is supported.**

Map 4.6 – White Mesa Lake - Sample Site 26COWSPRLA09



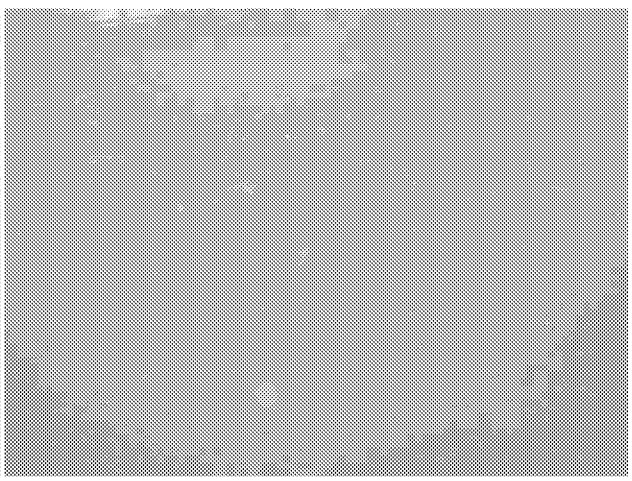
Photographs 4.6 – White Mesa Lake - Sample Site 26WMESALAK11



July 19, 2006 – looking northwest

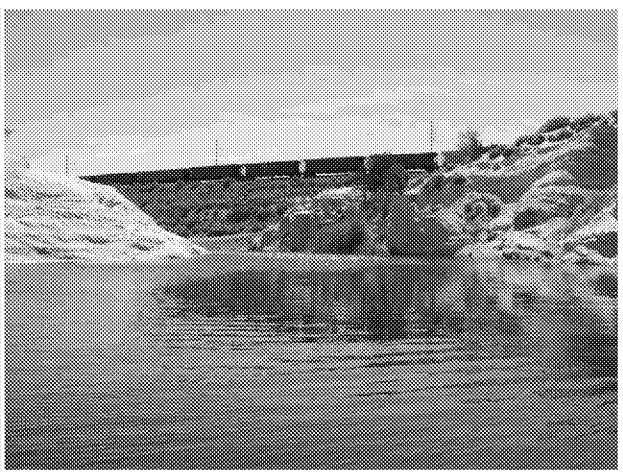
July 19, 2006 – looking southeast

July 19, 2006 – wetlands at northeast end



July 19, 2006 - goldfish

August 28, 2008 – looking northwest



August 28, 2008 – looking southeast toward railroad track

Table 4.6 – White Mesa Lake – Water Quality Data Assessment Table

Site 26WMESALAK11

Site	Alias	Location
26WMESALAK11	26-11	White Mesa Lake

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2006-2009	3	2008-2009	2

*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
FC	0	0	0	0
PrHC	0	0	0	0
ScHC	0	0	0	0
A&WHbt (A)	1	1	1	1
A&WHbt (C)	1	1	1	1
AgWS	0	0	0	0
LW	0	0	0	0

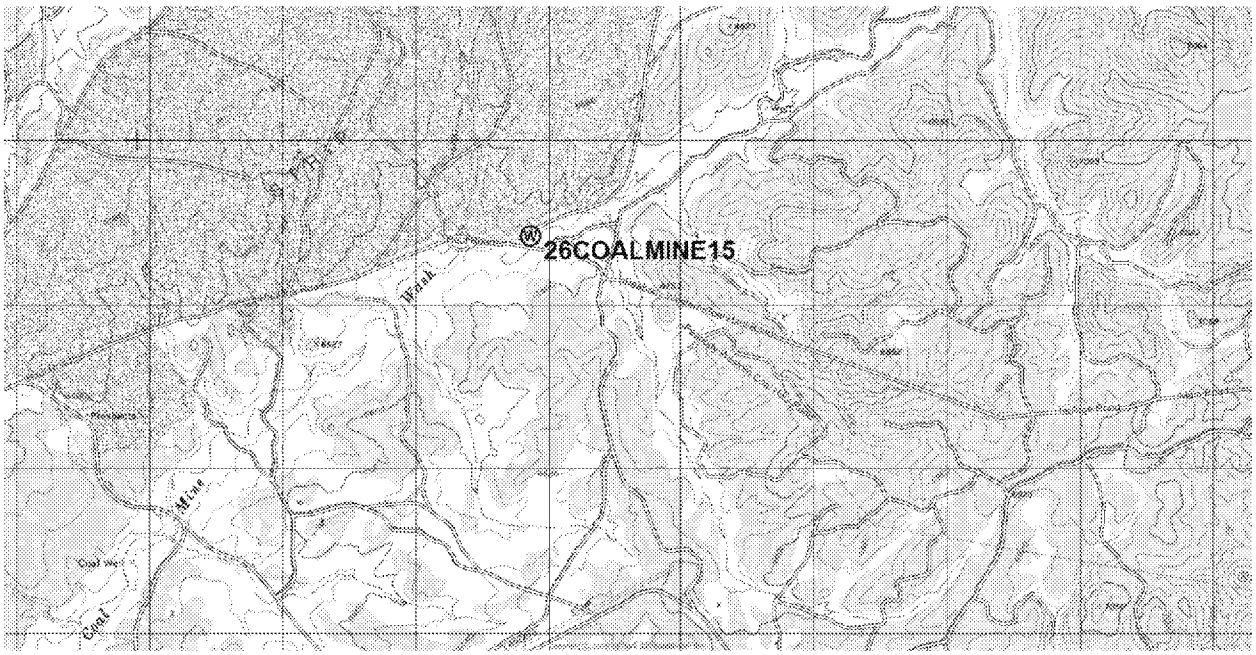
	Aquatic and Wildlife Habitat (Acute)					
	All samples			Assessment period		
Analyte	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	1	3	33.3%	1	2	50.0%
Chlorine (T)	--	0	--	--	0	--
Copper (D)	0	3	0.0%	0	2	0.0%
Lead (D)	0	3	0.0%	0	2	0.0%
Selenium (T)	0	3	0.0%	0	2	0.0%
Zinc (D)	0	3	0.0%	0	2	0.0%

	Aquatic and Wildlife Habitat (Chronic)					
	All samples			Assessment period		
Analyte	Exceedances	n	Percent	Exceedances	n	Percent
Cadmium (D)	1	3	33.3%	1	2	50.0%
Chlorine (T)	--	0	--	--	0	--
Copper (D)	0	3	0.0%	0	2	0.0%
Lead (D)	0	3	0.0%	0	2	0.0%
Nickel (D)	0	3	0.0%	0	2	0.0%
Selenium (T)	0	3	0.0%	0	2	0.0%
Zinc (D)	0	3	0.0%	0	2	0.0%

4.6 White Mesa Lake - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? No**
- **Category of Designated Use Support: Category 3 - There is insufficient data to determine if any designated use is supported.**

Map 4.7 – Coal Mine Wash - Sample Site 26COALMINE15

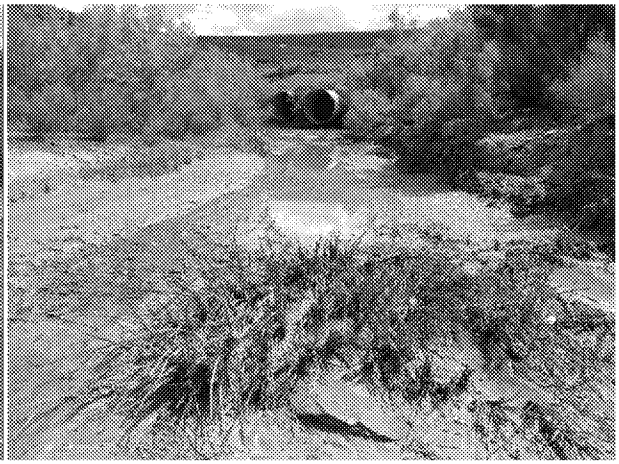


Photographs 4.7 – Coal Mine Wash - Sample Site 26COALMINE15

July 24, 2017 – looking downgradient **July 24, 2017 – looking upgradient**

Photographs 4.7 – Coal Mine Wash - Sample Site 26COALMINE15 (continued)

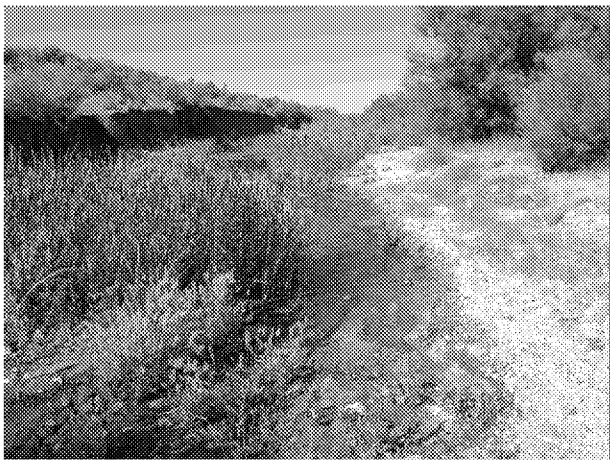
August 17, 2017



August 17, 2017

August 14, 2019

August 14, 2019



August 20, 2019 **August 20, 2019**

Photographs 4.7 – Coal Mine Wash - Sample Site 26COALMINE15 (continued)

August 28, 2019 **August 28, 2019**

Table 4.7 – Coal Mine Wash – Water Quality Data Assessment Table

Site 26COALMINE15

Site	Alias	Location
26COALMINE15	26-15	Coal Mine Wash

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2017-2019	5	2017-2019	5

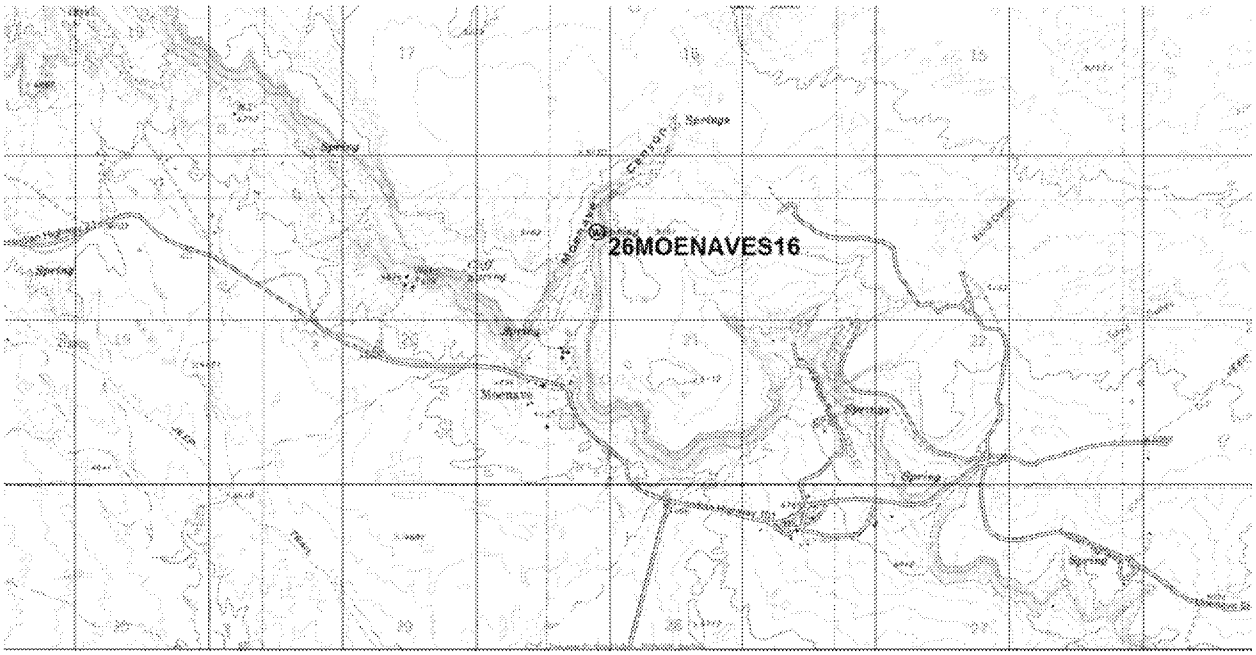
*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
FC	0	0	0	0
PrHC	0	0	0	0
ScHC	0	0	0	0
A&WHbt (A)	0	0	0	0
A&WHbt (C)	0	0	0	0
AgWS	0	0	0	0
LW	0	0	0	0

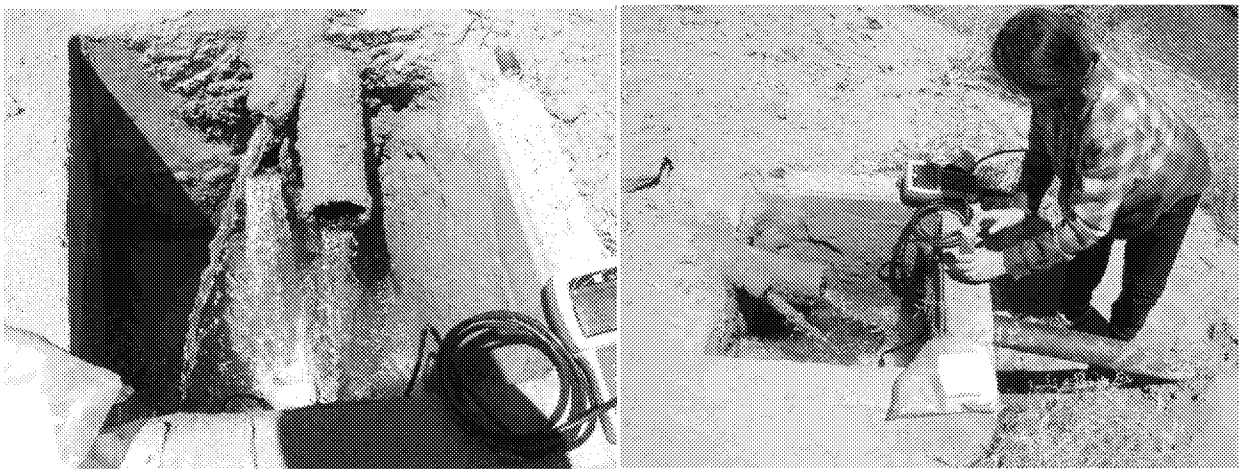
4.7 Coal Mine Wash - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? Yes.**
- **Category of Designated Use Support: Category 1 – All designated uses are supported**

Map 4.8 – Moenave Springs - Sample Site

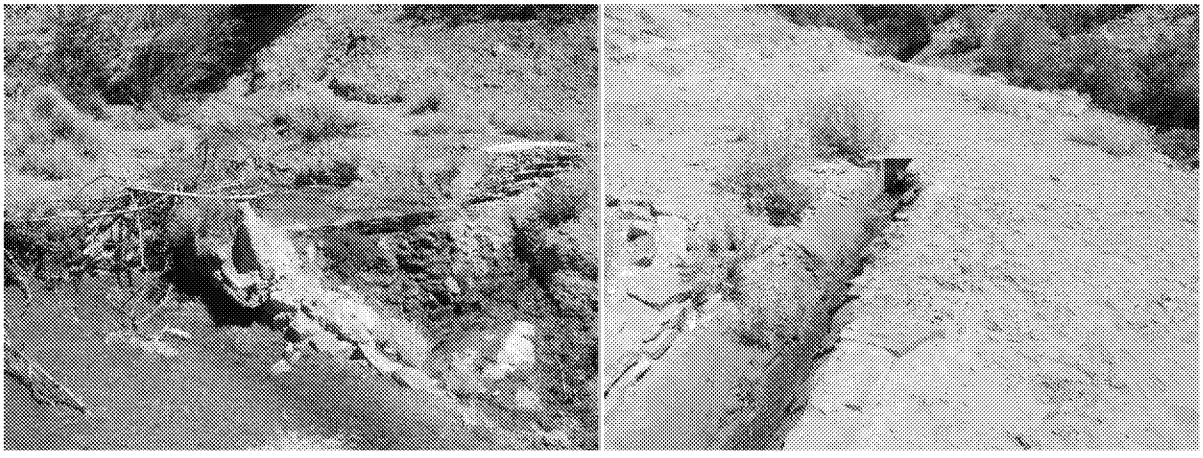


Photographs 4.8 – Moenave Springs - Sample Site



August 22, 2017 – sample location **August 22, 2017 – staff using YSI meter at site**

Photographs 4.8 – Moenave Wash and Irrigation Canal from Sample Site



August 22, 2017 – Moenave Wash and irrigation canal from spring sampling site

Table 4.8 – Moenave Spring – Water Quality Data Assessment Table

Site 26MOENAVIS16

Site	Alias	Location
26MOENAVES16	26-16	Moenave Spring

Total		Assessment period	
Year(s) sampled	# of Sample Events	Year(s) sampled*	# of Sample Events*
2017-2019	5	2017-2019	5

*Note that not all analytes were necessarily sampled each sample event.

	All samples		Assessment period	
Designated Use	Total number of exceedances	Total analytes exceeded	Total number of exceedances	Total analytes exceeded
Dom	0	0	0	0
FC	0	0	0	0
PrHC	0	0	0	0
ScHC	0	0	0	0
A&WHbt (A)	0	0	0	0
A&WHbt (C)	0	0	0	0
AgWS	0	0	0	0
LW	0	0	0	0

4.8 Moenave Spring - Designated Use Support and Impairment Determination

- **Was the minimum number of samples to determine designated use support obtained during the assessment period? Yes.**
- **Category of Designated Use Support: Category 1 – All designated uses are supported**

5.0 References

United States Government Printing Office (USGPO). March 1988. The Clean Water Act As Amended By The Water Quality Act Of 1987 Public Law 100-4.

NNEPA. July 23, 1999. Navajo Nation Clean Water Act.

NNEPA. November 9, 1999. Navajo Nation Water Quality Standards.

NNEPA. May 13, 2008. Navajo Nation Surface Water Quality Standards 2007

NNEPA. 2015. Navajo Nation Surface Water Quality Standards 2015. Passed by Navajo Nation Council Resources and Development Committee on May 23, 2017

United States Geological Survey. 1987. Hydrologic Unit Maps, United States Geological Survey Water- Supply Paper 2294.